

REMARKS

Claims 1-15 are all the claims pending in the application. Claims 3 and 5-14 have been withdrawn from consideration by the Examiner. Claim 15 has been added. Reconsideration and allowance of all the claims are respectfully requested in view of the following remarks.

Specification

The Examiner objected to the disclosure as including informalities specified in item 2 on page 2 of the Office Action. Applicant has amended the specification in a manner believed to overcome this objection.

Claim Rejections - 35 U.S.C. § 112

The Examiner rejected claim 1 under §112, 2nd paragraph, as indefinite. The Examiner noted specific instances of alleged indefiniteness in item 3 on page 3 of the Office Action. Applicant has amended claim 1 in a manner believed to overcome this rejection. Specifically, “a large number” has been amended to recite --a plurality--.

Claim Rejections - 35 U.S.C. § 102

The Examiner rejected claims 1, 2, and 4 under §102(b) as being anticipated by US Patent 3,170,336 to Bohnhoff (hereinafter Bohnhoff). Applicant respectfully traverses this rejection because Bohnhoff fails to disclose all of the elements as set forth and arranged in the claims.

Each of claims 1 and 2 independently sets forth a ball screw apparatus comprising at least one side cap mounted on a circumferential outer surface of the nut and including a ball circulation passage. By way of non-limiting example, as shown in Figs. 1-3, one embodiment consistent with that set forth in claims 1 and 2 includes a ball screw apparatus comprising at least one side cap 7 mounted on the circumferential outer surface of the nut 5 and including a ball circulation passage 12. That is, the at least one side cap is located on the circumferential outer surface of the nut; not on the axial end face of the nut.

In contrast to that set forth in each one of claims 1 and 2, Bohnhoff discloses a ball screw apparatus wherein a return fixture 16 is mounted to the axial end face of the nut 12; it is not mounted on the circumferential outer surface of the nut.

The side cap structure of the presently claimed invention is distinguishable from the end-cap type of apparatus in Bohnhoff in various aspects. For example, if a plurality of nuts are employed in the ball screw apparatus, nuts of the type as presently claimed may be directly linked together. That is, in the presently claimed invention, the connecting portions which connect the nuts are the axial ends of the nut itself, which can support an axial load. On the other hand, the nuts of Bohnhoff's end cap structure are not designed to support an axial load, are not strong enough to endure the axial load and, thus, a flange is necessary to link together a plurality of Bohnhoff's type nuts; they cannot be directly connected to one another.

Additionally, with respect to claim 1, Bohnhoff's end cap structure has a problem that if one of the end caps breaks, all of the balls in the nut will be lost and the ball screw apparatus will not work. On the other hand, in the claim 1 structure, there are provided multiple ball circulation paths on a single nut using the side cap structure—and one of the side caps is disposed on each of the multiple threads. With such a structure, breakage of one ball circulation path or side cap will not result in the loss of all of the balls in the nut and the nut can still function as a ball screw apparatus.

For at least the above reasons, Bohnhoff fails to anticipate independent claims 1 and 2. Likewise, this reference fails to anticipate dependent claim 4.

New Claim

Claim 15 has been added. Support for claim 15 can be found at least in Figs. 1-3 and, thus, claim 15 is readable on the elected species. Claim 15 is distinguishable from that disclosed in Bohnhoff for reasons similar to those presented above in connection with claims 1 and 2.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Jeffrey A. Schmidt", written over a horizontal line.

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